

HIGH BOND STRENGTH INTERLAYER FOR RHENIUM HOT GAS EROSION PROTECTIVE COATINGS

ABSTRACT OF THE DISCLOSURE

A method for producing a coated carbon composite material is provided. The resulting coated composite is useful for applications such as rocket nozzles and valve bodies that encounter the high temperature and high flow rates in rocket propulsion and control. A carbon substrate such as graphite is first coated with rhenium. A layer of ruthenium is then deposited on the rhenium. The materials are heated at high temperature so as to melt the ruthenium. The ruthenium melts and penetrates through the rhenium layer and into pores of the carbon substrate. The rhenium and ruthenium are mutually soluble and further form a rhenium/ruthenium alloy. Upon solidification of the rhenium/ruthenium alloy interlayer, a further rhenium coating may be deposited thereon. The rhenium/ruthenium interlayer provides a high strength bond between the carbon substrate and the rhenium coating. This high strength bond achieved through use of the interlayer minimizes the problem of loss of adhesion sometimes encountered between carbon substrates and their rhenium coatings.